

The Japanese words, TSUCHI and DOJŌ in school education

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Abstract

Observations were carried out on the Japanese words, TSUCHI and DOJŌ in school education of Japan, compared with English words, “earth and soil”, German words, “Erde and Boden” and French words, “terre and sol” through dictionaries. In addition, illustrated books for children and textbooks for elementary school in America were surveyed concerning how TSUCHI is instructed. TSUCHI is considered to be correspondent to earth and DOJŌ to soil in English. Recently in America, soil is used in wide sense in school education without distinction from earth. The Japanese DOJŌ is very difficult for early childhood and elementary educations.

It is hopeful that TSUCHI should be instructed in wide sense, including DOJŌ as the term soil used everywhere in America and that arrangement of data given from classification of particles by sieving of TSUCHI should be carried out correctly: for example, discussions of which is right as regards the expression of “over 2mm” or “2mm and over”.

Key words : TSUCHI (土), DOJŌ (土壌), School education

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1. Introduction

In Japan, education at the elementary and secondary levels is carried out based on the Course of Study issued by the Ministry of Education. School boys and girls are obliged to learn “TSUCHI” in the third grade science class. The Course of Study shows that teachers should instruct that TSUCHI is composed of gravel, sand, clay, ect. and mixing of those materials is different from place to place.

Presentation was made by Suzuki¹⁶⁾ on some problems in teaching TSUCHI in 1991. It was emphasized at that time that teachers should know the definition of TSUCHI,

which is an admixture of inorganic and organic matter, the word being not found in technical books and dictionaries and that the word, earth might be equivalent to “TSUCHI”, because the word, earth is used in the illustrated book for children¹¹⁾.

Few papers have been hitherto reported on TSUCHI. Recently, I found the following papers :

ŌKA(1992)¹³⁾ reported that TSUCHI burns and admixed organic matter goes up to the atmosphere, turning into gas. Hada (1993)⁶⁾ reported that the concept of TSUCHI should be instructed, setting limits to DOJŌ and rock-weathering materials. It is difficult for instructors to teach TSUCHI and for students to learn it.

Well, I will report on some considerations regarding the words, “TSUCHI”, “DOJŌ” and school education.

2. TSUCHI in school education of Japan

The term TSUCHI is not found in technical term dictionaries. Generally, the word has been used with wide and familiar meanings by most of the Japanese in their daily life since former days. For example, they say as follows : things made of TSUCHI ; animals living in TSUCHI ; to bury in TSUCHI ; to return to TSUCHI (which means dying) ; and so on.

School boys and girls learn TSUCHI (土 in Japanese kanji) in the first grade home language class¹⁹⁾ and the third grade science class¹²⁾. The Course of Study for Elementary School, Science shows that teachers should instruct that TSUCHI is composed of a mixture of gravel, sand, clay, etc., mixing-way of which is different from place to place and that in students' experiments, they should make observations of different particles in grain-size : gravel, sand, or clay, using a Lupe for the materials classified through a sieve. In experiments of sieving TSUCHI, it is important to use correctly the table for classifications of particles, for example, because most of the teachers are apt to say 2mm and over (2mm IJŌ in Japanese) for the expression 2mm <, which should be said over 2mm (2mm CHŌ in Japanese).

I emphasized in 1991¹⁶⁾ and 1992¹⁷⁾ that the correct expression is necessary for students to easily understand their experiments and for class to be activated and that the expression “etc.” should be instructed, including “organic matter” which is one of important materials composing TSUCHI.

He put the earth in a box.
He patted it carefully.



With his finger he made three holes in
the earth: one—two—three! He had three
little hard brown seeds. He dropped the
seeds into the holes: one—two—three!

He covered the seeds with the earth.



Fig. 1. How to use earth, after the book for children¹¹⁾

3. DOJŌ in school education of Japan.

The term DOJŌ is not taught for any boys and girls ranging from the first grade to the sixth grade in elementary schools¹⁹⁾ and is done for students of the second grade in junior high schools²⁰⁾. It is, I think, because the Japanese “kanji” 土壤 of DOJŌ is too difficult for elementary school students to learn.

4. Earth and soil in school education of America.

1) Illustrated books for children¹¹⁾²¹⁾

Fig. 1. shows that the expression “earth” is used here and there for the explanation of the illustrations. Fig. 2. shows that expression “soil” is used just like in Fig. 1.

2) Text book for elementary school⁵⁾



Soil

Without water and air,
we would have no soil.
And we would have no plants.
Most plants cannot grow in hard rock.
Plants like to grow in soil.
What is soil made of?
It is made of bits of rock
and tiny bits of dead plants.
Wind and water have worn these bits of rock
until they are very, very small.
You can rub them between your fingers.
Tiny bits of long-dead plant are mixed in, too.
They are crumbled to dust.
They help make the soil rich.

Fig. 2. How to use soil, after the book for children²¹⁾

The text book, Science in your world shows that students learn : Chapter “Land around us”, Lesson “Soil” in the first grade ; Chapter “Plants”, Lesson “Plant Grow” in the second grade ; Chapter “Rocks”, Lesson “Soil and Erosion” and Chapter “Water”, Lesson “Runoff and Groundwater” in the third grade ; Chapter “Soil and Land Conservation”, Lesson “Soil : A Natural Resource” in the sixth grade, whose Glossary shows that soil is a mixture of weathered rocks and organic matter in which plants grow.

In any page is no found the the term“earth” used in the same meaning as the term

Other living things use soil.
Can you think of ways they use it?

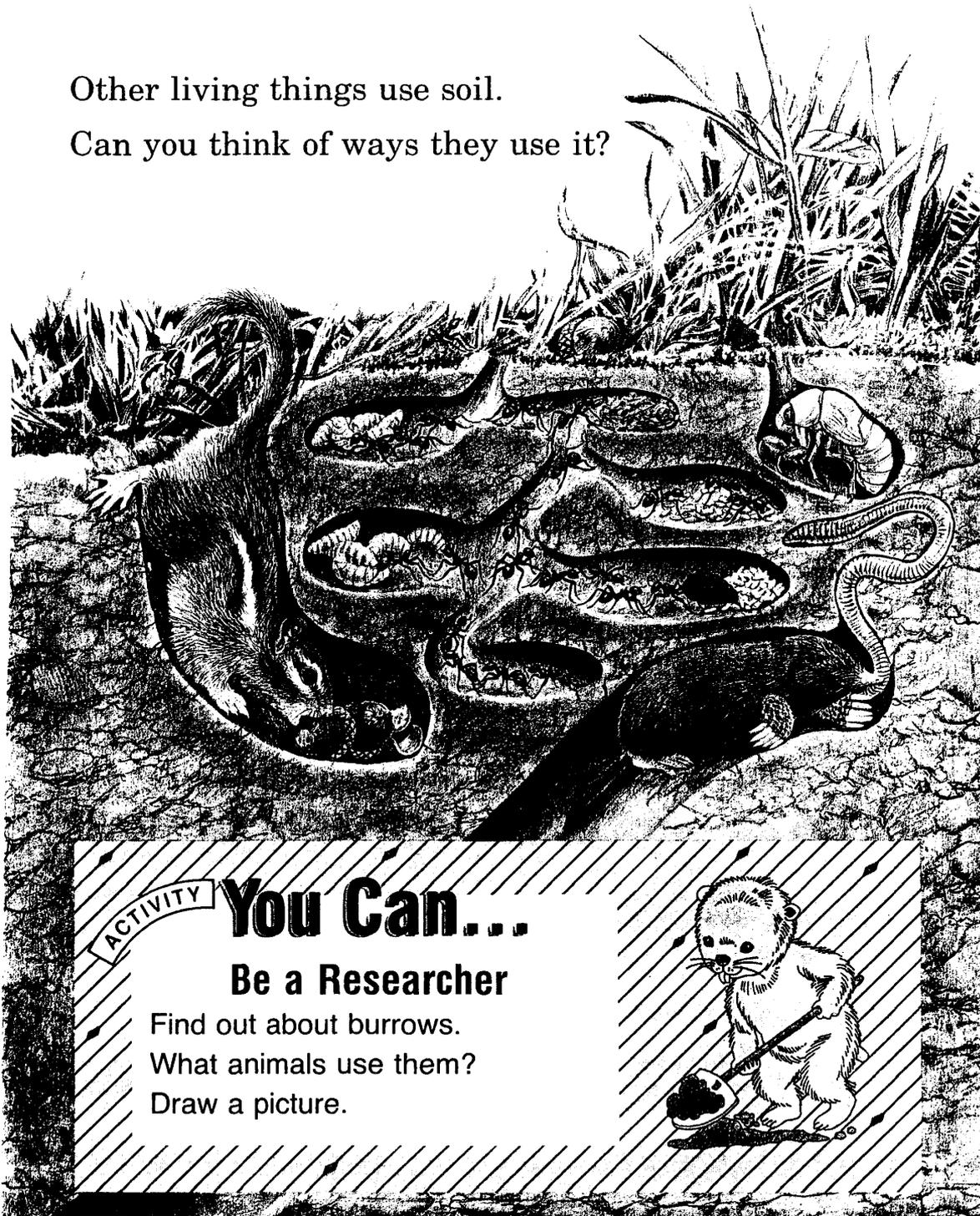


Fig. 3. How to use soil like earth in Fig. 1., after the textbook for elementary schools⁹⁾.

earth in Fig. 1. The siol in Fig. 3⁵⁾ sounds like earth, where burrowing animals live.

5. Dictionaries

1) Dictionaries in Japanese

a. KOJIRIN⁹⁾ : TSUCHI is powder-like material derived from decomposition of rock ; the same as DOJŌ. DOJŌ is fine-grained powder-like material derived from disintegration of rock ; TSUCHI.

b. SHINSENKOKUGOJITEN¹⁰⁾ : TSUCHI is powder-like material derived from decomposition of rock ; DOJŌ. DOJŌ is an admixture of inorganic matter derived from disintegration of rock on the surface of the globe and organic matter derived from decomposition of animal and plant ; the same as TSUCHI.

c. RIKAGAKUJITEN⁷⁾ : DOJŌ is sediments of inorganic matter derived from decomposition rock of the surface of earth's crust, which mostly contain animal and plant materials decomposed to different degrees. It is classified into gravel, sand, and clay by grain-size.....

d. CHIGAKUJITEN³⁾ : DOJŌ is admixture of inorganic and organic matters mostly somewhat colored with humus, which is produced on the surface of the earth's crust.

This reveals that both the terms TSUCHI and DOJŌ are found in common dictionaries and the term TSUCHI is not found in scientific special dictionaries.

2) Dictionaries in foreign languages :

a. Webster's New International Dictionary of the English Language¹⁾

earth : [The word from Anglo-Saxon origin, akin to German erde]

1. The soft matter composing part of the surface of the globe, in distinction from the firm rock ; soil, ground. In old chemistry earth was regarded as an element.
2. The world of land and sea ; esp., this world as the dwelling place of man, in distinction from heaven and hell, as the dwelling places of spirits.
3. The land ; land areas, as distinguished from the sea ; also, land considered as a mere solid surface or ground ; hence, the solid materials which make up the globe.
4. A part of the ground ; a country land.
5. The planet which we inhabit, the fifth in order of size and third in order of distance from the sun.
6. The people on this planet.
7. The covert or lair of a burrowing animal.

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8. The mortal body.
9. Chem. Any of several difficultly reducible metallic oxides, as alumina, zirconia, yttria, formerly classed as elements.
10. Elec. = ground

soil : [The word from French origin]

1. Firm land ; earth ; ground ; also, Now Rare, a piece of ground ; a tract of land.
2. The upper layer or layers of earth which may be dug, plowed, excavated, etc. ; specif., the loose surface material of the earth in which plants grow, in most cases consisting of disintegrated rock with an admixture of organic matter and soluble salts.
3. The surface earth of a particular place with reference esp. to its composition or its adaptability to the ends of the farmer, builder, engineer, etc. ; as peaty or sandy soils ; rich or fertile ; your soils deficient in alkali.
4. A country or land ; as, one's native soil.
5. Cultivated or tilled ground or the tillage of such ; farming ; also, the agricultural class, life, or calling ; as, one who works on the soil ; a son of the soil ; deeply attached to the soil.
6. Any substance, medium, condition, etc., in which something may take root and grow ; as, social discontent is the soil in which anarchy thrives.

b. Dictionary of Geological Terms²⁾

earth :

1. The solid matter of the globe in distinction from water and air. The ground. The firm land of earth's surface.
2. Loose material of the earth's surface ; the disintegrated particles of solid matter in distinction from rock ; soil.
3. Chem : A name formerly given to certain inodorous, dry, and unflammable substances which are metallic oxides but were formerly regarded as elementary bodies.
4. A term used for soft shaly or clayey ground when sinking coal measures.
5. Material which can be removed and handled economically with pick and shovel or by hand, or when can be loosened and removed with a power shovel.

soil :

1. Pedol : That earth material which has been so modified and acted upon by physical, chemical and biological agents that it will support rooted plants.

2. Engin. geol : The term soil is equivalent to saprolith, which is the layer of loose, incoherent rock material of whatever origin, that nearly everywhere forms the surface of the land and rests on the hard or “bed” rocks and which comprises rock waste of all sorts, volcanic ash, gracial drift, alluvium, windblown deposits, vegital accumulations, and soils.

The Japanese term “DOJŌ” is considered to be correspondent to “soil” in English, “Boden” in German and “sol” in French.

6. Discussions

The term TSUCHI has been used with wide and familiar meanings and feelings by most of the Japanese in their daily life since former days. DOJŌ has been used particularly by farmers. Common dictionaries show that TSUCHI is explained seemingly just like DOJŌ⁹⁾¹⁰⁾. The term TSUCHI is not considered to be a science word, because it is not found in any special science dictionaries³⁾⁷⁾.

Sudo-danwakai (meaning “symposium by Prof. Emeritus Sudo, specialist of clay, as the chief)¹⁴⁾ says that as follows : TSUCHI is composed of different particles in grain-size named as gravel, sand and clay and classified into many sorts by the content of clay : the nature of TSUCHI depends on the content of clay. DOJŌ has somewhat different meanings according to geology, pedology and engineering science related with TSUCHI. It is, however, true that fine-grained particles of clay exist as one of important roles in each DOJŌ.

Detailed explanations are found in dictionaries in foreign languages, concerning “earth” and “soil”¹⁾²⁾⁸⁾. What I am interested in is marked with underlines. Strictly speaking, it seems that earth is from Anglo Saxon origin, akin to German *erde* and soil is from French origin, both being of just a little difference.

In America, some book uses the word *earth*¹¹⁾ and some book uses the word *soil*, including the meaning of *earth* as well²¹⁾, as concerns illustrated books for children. For the part of an elementary school textbook⁹⁾, the term *soil* is found everywhere ranging from the 1st grade to the 6th grade.

Judging from the comparison between “earth” and “soil”, it is considered that TSUCHI is correspondent to *earth* and DOJŌ to *soil*. Of course, the term *earth* used for making compound words is still found wherever : *earthworm*, *earthquake*, *earthenware*, etc. But, ceramic specialists⁴⁾ say that *earthenware* is TŌKI in Japanese and the term

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Table 1. TSUCHI and DOJŌ compared with English, German, and French words, respectively. Based on the present writer's consideration

Japanese	TSUCHI	DOJŌ
English	earth	soil
German	Erde	Boden
French	terre	sol

terre cuite is DOKI in Japanese, which means ceramic things made of TSUCHI : terre is French and earth is English : I think correspondences of TSUCHI to the terms earth in English, Erde in German and terre in French would be listed as shown in Table 1.

Hada says that the expression TSUCHI as concerns alluvium and deluvium should be eliminated from school education⁶⁾. It is, however, obvious that the Japanese “kanji”, DOJŌ is difficult for elementary school students to learn and the word is instructed not in elementary school home language class but in junior high-school home language class. So, It might be natural that the term TSUCHI should be instructed even in science class, including the meaning of DOJŌ as well. Of course, it is important that the term organic matter should be instructed as one of the composition of TSUCHI like books in America⁵⁾²¹⁾. Ōka says in his report¹³⁾ that he would like to let students find out that TSUCHI also burns on heating, changing the color and admixed organic matter releases gas due to chemical change, which goes up to the atmosphere. Such instruction would not be able to let students understand correctly the experiment. The expression “burn” is not correct. Clay minerals contained in TSUCHI change the composition by heat, whose phenomenon is not “burning”.

Anyway, we can not eliminate the existence of clay particle : clay minerals from the conception of TSUCHI as concerns inorganic matter except organic matter contained. In addition to it, I would like to emphasize that explanations should be correctly carried out for the table given on classifying particles of TSUCHI through a sieve¹⁷⁾ and it is hopeful that class would be activated by teaching correctly, comprehensibly and enjoyably¹⁵⁾¹⁶⁾¹⁷⁾¹⁸⁾.

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